

# ***GPM Ground Validation Satellite Overpasses IFloodS***

## **Introduction**

The GPM Ground Validation Satellite Overpasses IFloodS dataset contains plots of satellite overpass paths centered over eastern Iowa during the Global Precipitation Measurement (GPM) mission Iowa Flood Studies (IFloodS) field campaign. The campaign aimed to collect detailed measurements of precipitation at the Earth's surface while simultaneously collecting data from satellites passing overhead. This dataset consists of paths for Earth observation satellites operating during the campaign: NASA's AQUA, TERRA, and CloudSat satellites; NOAA's NOAA-15, NOAA-16, NOAA-17, NOAA-18, and Suomi NPP satellites; Europe's MetOp-A and MetOp-B satellites, and DMSP's F-15, F-16, F-17, and F-18 satellites. The satellite overpasses are provided as PNG plot images and as KML files with which the paths can be imported and viewed in Google Earth.

## **Citation**

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## **Keywords:**

*NASA, GHRC, PMM, GPM GV, IFloodS, Iowa, satellite overpasses, NOAA, EUMETSAT, EOS, JPSS, AQUA, TERRA, NOAA-15, NOAA-16, NOAA-17, NOAA-18, Suomi NPP, MetOp-A, MetOp-B, CloudSat, DMSP, F-15, F-16, F-17, F-18*

## **Campaign**

The Global Precipitation Measurement mission Ground Validation (GPM GV) campaign used a variety of methods for validation of GPM satellite constellation measurements prior to and after the launch of the GPM Core Satellite, which launched on February 27, 2014.

The instrument validation effort included numerous GPM-specific and joint agency/international external field campaigns, using state of the art cloud and precipitation observational infrastructure (polarimetric radars, profilers, rain gauges, and disdrometers). These field campaigns accounted for the majority of the effort and resources expended by GPM GV mission. More information about the GPM mission is available at the [PMM Ground Validation webpage](#).

The Iowa Flood Studies (IFloodS) field campaign was a ground measurement campaign that took place in central-northeastern Iowa from May 1 to June 15, 2013. The main goal of IFloodS was to evaluate how well the GPM satellite rainfall data can be used for flood forecasting. Specifically, this meant collecting detailed measurements of precipitation at the Earth's surface using ground instruments and advanced weather radars while simultaneously collecting data from satellites passing overhead. Satellite datasets were obtained from NOAA, DMSP, NASA, EUMETSAT, JAXA, and GOES spaceborne instruments. The ground instruments were used to thoroughly characterize precipitation and contribute to improved satellite rainfall estimates; in particular, the improvement of algorithms that interpret raw data for the GPM mission's Core Observatory satellite. More information about IFloodS is available at the [IFloodS Field Campaign webpage](#) and more information about GPM's partner organization for this project, the Iowa Flood Center, is available on the [Iowa Flood Center website](#).

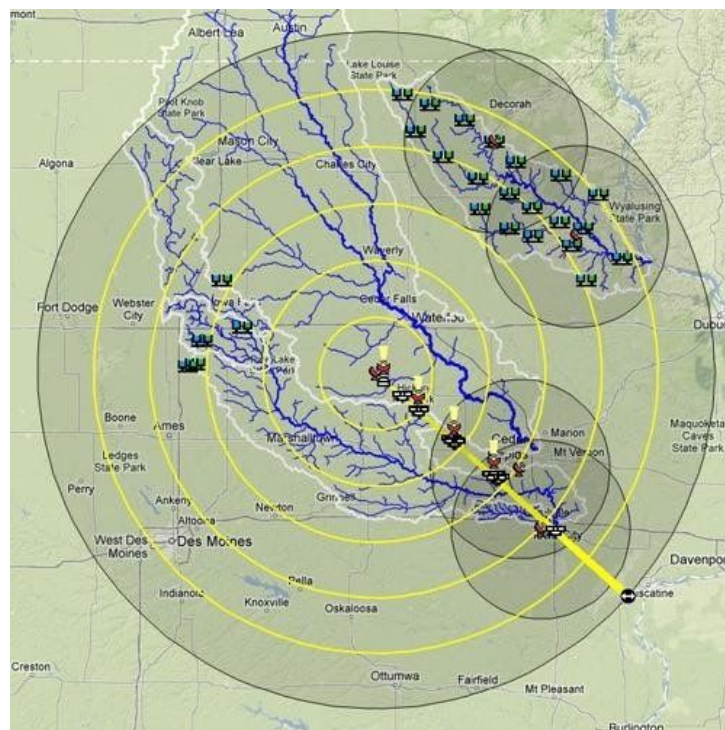


Figure 1: Areas of focus during the IFloodS campaign were the Cedar and Iowa River Basins, the South Fork Iowa River, and the Turkey River Basin in Northeast Iowa.

(Image source: [PMM IFloodS webpage](#))

## Instrument Description

During IFloodS, there were several Earth observation satellites collecting precipitation data over the field campaign study area. These satellite measurements were archived from microwave imaging and sounding radiometers flying onboard NOAA, NASA, EUMETSAT, and DMSP satellites. NASA's AQUA, TERRA, and CloudSat satellites form part of the agency's Earth Observing System (EOS). The polar/low-Earth orbiting satellites provide long-term space-based observations of Earth, including the land, atmosphere, and oceans. NOAA's NOAA-15, -16, -17, and -18 are polar-orbiting satellites used for weather observations. The Suomi National Polar-orbiting Partnership (NPP) satellite was developed by NASA and is operated by NOAA. It forms the start of the Joint Polar Satellite System (JPSS) which will serve as a new generation of environmental satellites. The Meteorological Operational satellite A (MetOp-A) and B (MetOp-B) are part of a series of 3 polar-orbiting weather observation satellites operated by the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT). The Defense Meteorological Satellite Program (DMSP) F-15, F-16, F-17, and F-18 provide satellite observations of environmental features to aid in the U.S. Department of Defense military operations. More information about each satellite is available at the following links: [AQUA](#), [TERRA](#), [NOAA-15](#), [NOAA-16](#), [NOAA-17](#), [NOAA-18](#), [SUOMI NPP](#), [MetOp-A](#), [MetOp-B](#), [CloudSat](#), [DMSP](#). More information about satellite orbits is available on this [NASA Earth Observatory webpage](#).

## Investigators

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## Data Characteristics

The GPM Ground Validation Satellite Overpasses IFloodS dataset is a browse-only dataset. Browse imagery of satellite passes during IFloodS are available in PNG format and KML format for viewing in Google Earth. The browse image files are available at a Level 1A processing level. More information about the NASA data processing levels is available on the [EOSDIS Data Processing Levels webpage](#). The characteristics of this dataset are listed in Table 1 below.

Table 1: Data Characteristics

Characteristic	Description
Platform	AQUA, TERRA, NOAA-15, NOAA-16, NOAA-17, NOAA-18, Suomi National Polar-orbiting Partnership (Suomi NPP); Meteorological Operational satellite A (MetOp-A), Meteorological Operational satellite B (MetOp-B), CloudSat, Defense Meteorological Satellite Program (DMSP) F-15, DMSP F-16, DMSP F-17, DMSP F-18

Instrument	Global Positioning System (GPS)
Spatial Coverage	N: 47.39, S: 38.41, E: -85.86, W: -98.12 (Upper Midwest, U.S.)
Temporal Coverage	April 1, 2013 - June 30, 2013
Temporal Resolution	Daily
Sampling Frequency	Hourly -< Daily
Parameter	Satellite Orbits/Revolution
Version	1
Processing Level	1A

## File Naming Convention

The GPM Ground Validation Satellite Overpasses IFloodS dataset browse files are available in PNG and KML format. The files are named using the following convention:

### Browse Files:

ifloods\_sat\_passes\_YYYYMMDD.kml

ifloods\_sat\_passes\_YYYYMMDD.png

Table 2: File naming convention variables

Variable	Description
YYYY	Four-digit year
MM	Two-digit month
DD	Two-digit day
.kml	Google Earth file format (Keyhole Markup Language - KML)
.png	Portable Network Graphics (PNG) format

## Data Format and Parameters

The GPM Ground Validation Satellite Overpasses IFloodS dataset consists of browse imagery of satellite overpass paths during the IFloodS field campaign. These imagery display the path that each satellite took as it passed over the IFloodS field campaign study region. There are PNG image files and KML files that can be imported into Google Earth where they can be viewed on a 3-D render of Earth. Each file type is described in more detail below.

### PNG Browse Files

The PNG browse imagery are stored as daily files. Each PNG image contains color-coded and numbered ground paths of each satellite's pass(es), plotted onto a map. The map includes latitudes and longitudes, state borders, the time of each satellite pass, and the date. The map is centered over the IFloodS study region displaying primarily the Upper Midwest.

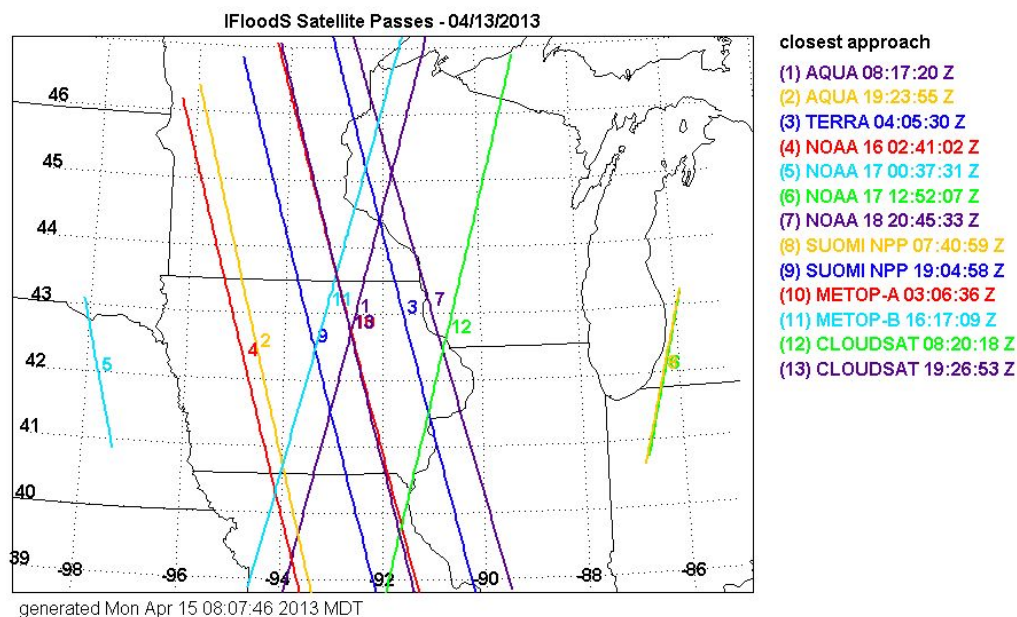


Figure 2: IFloodS Satellite Passes for April 13, 2013  
(Image source: [NASA GHRC](#))

### **KML Browse Files**

The KML browse files are made to be displayed in Google Earth. Once downloaded, the KML files can be imported from your computer or Google Drive to be displayed on a Google Earth map. Once imported, the files will display as satellite ground paths centered over the campaign area. The paths include the satellite name, timestamps along the path indicating the time at which the satellite was passing over that point, and the pass number if the satellite made more than one pass during that day. More information on how to import the KML files into Google Earth is available on the [Google Earth Help webpage](#).

### **Software**

The PNG files can be viewed using most image software. The KML files can be imported and viewed in Google Earth. Follow this [link](#) to the Google Earth Help webpage where step-by-step instructions are given on how to import and view the KML files in Google Earth.

### **Known Issues or Missing Data**

There are no known issues with these data or any known gaps in the dataset.

### **References**

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## Related Data

All data from other instruments collected during the IFloodS field campaign are considered to be related datasets. These data can be located by searching 'IFLOODS' in [HyDRO2.0](#).

## Contact Information

To order these data or for further information, please contact:

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